CLAIMS

1. The present invention provides a method of strong decorrelation of signals which are input, characterised in that it includes the steps of:-
    a) processing the input signals to determine delay and rotation parameters which implement at least one elementary paraunitary matrix and transform the input signals into output signals to obtain improvement in a measure of strong decorrelation;
    b) assessing the improvement in the measure of strong decorrelation, and if it is significant designating the output signals as input signals and iterating step a) and this step b);
    c) if the improvement is not significant designating the output signals as signals decorrelated in a wide sense.

2. A method according to Claim 1 characterised in that the delay and rotation parameters which transform the input signals characterise a single elementary paraunitary matrix.

3. A method according to Claim 2 characterised in that it includes producing a paraunitary matrix by cumulatively multiplying successive elementary paraunitary matrices produced by iterating step a).

4. A method according to Claim 2 characterised in that the range of signal delay parameters is a set of discrete delay vectors, and the delay and rotation parameters are determined by generating a respective version of the input signals delayed by each delay vector in the set, and for each version finding rotation parameters which at least approach producing maximisation of output signals' strong decorrelation.

5. A method according to Claim 4 characterised in that the rotation parameters which at least approach producing maximisation of output signals' strong decorrelation are determined using an algorithm for pointwise decorrelation of the kind used in instantaneous decorrelation.

6. A method according to Claim 1 involving n input signals where n is an integer

greater than 2, characterised in that the range of signal delay parameters is a set of n-element delay vectors and the range of signal rotation parameters is a set of $n(n-1)/2$ angle parameters.

7. A method according to Claim 1 involving n input signals where n is an integer greater than 2, characterised in that step a) comprises determining delay and rotation parameters which implement at least one elementary paraunitary matrix providing for rotation of a pair of input signals and relative delay of the or as the case may be each other input signal.

8. A method according to Claim 7 wherein the n input signals are associated with respective channels characterised in that step a) has $n(n-1)/2$ successive stages each associated with at least one respective elementary paraunitary matrix and each providing for rotation of signals associated with a respective pair of channels and provision of relative delay associated with the or as the case may be each other channel, the first stage is arranged to process the input signals and the or as the case may be each subsequent stage is arranged to receive signals processed in the respective preceding stage.

9. A method according to Claim 1 involving a set of n input signals where n is an integer greater than 2, characterised in that it comprises:
   a) producing $n(n-1)/2$ replicas of the set of input signals,
   b) in each replica selecting a respective signal pair differing to that selected in other replicas, and
   c) the step of processing the input signals to determine delay and rotation parameters being carried out for each replica and comprising:
      i) determining delay and rotation parameters which implement at least one elementary paraunitary matrix providing for rotation of the respective selected signal pair only, and
      ii) determining which replica when transformed by the associated at least one elementary paraunitary matrix gives rise to transformed signals corresponding to improvement in a measure of decorrelation by at least a major part of a maximum extent obtainable over the replicas and designating these transformed signals as output signals.

10. A method according to Claim 1 characterised in that the at least one elementary paraunitary matrix implements at least one leading delay, rotation and terminal delay

11. Computer apparatus for strong decorrelation of signals, the apparatus being programmed for reception of input signals, characterised in that the apparatus is also programmed:-

    a) to process the input signals to determine delay and rotation parameters which implement at least one elementary paraunitary matrix and transform the input signals into output signals to obtain improvement in a measure of strong decorrelation;

    b) to assess the improvement in the measure of strong decorrelation, and if it is significant to designate the output signals as input signals and iterate a) and b);

    c) if the improvement is not significant to designate the output signals as signals decorrelated in a wide sense.

12. Apparatus according to Claim 11 characterised in that the delay and rotation parameters which transform the input signals characterise a single elementary paraunitary matrix.

13. Apparatus according to Claim 12 characterised in that the computer equipment is programmed to produce a paraunitary matrix by cumulatively multiplying successive elementary paraunitary matrices produced in iterative processing.

14. Apparatus according to Claim 12 characterised in that the range of signal delay parameters is a set of discrete delay vectors, and the computer equipment is programmed to determine the delay and rotation parameters by generating a respective version of the input signals delayed by each delay vector in the set, and to find for each version rotation parameters which at least approach producing maximisation of output signals' strong decorrelation.

15. Apparatus according to Claim 14 characterised in that the computer equipment is programmed to determine the rotation parameters which at least approach producing maximisation of output signals' strong decorrelation using a pointwise

decorrelation algorithm.

16. Apparatus according to Claim 11 programmed to receive n input signals where n is an integer greater than 2, characterised in that the apparatus is also programmed to determine delay and rotation parameters which implement at least one elementary paraunitary matrix providing for rotation of a pair of input signals and relative delay of the or as the case may be each other input signal.

17. Apparatus according to Claim 16 programmed to define respective channels for the n input signals characterised in that the apparatus is also programmed to process the input signals in $n(n-1)/2$ successive stages each associated with at least one respective elementary paraunitary matrix and each providing for rotation of signals associated with a respective pair of channels and provision of relative delay associated with the or as the case may be each other channel, the first such stage involving processing the input signals and the or as the case may be each subsequent stage involving processing signals resulting from processing in the respective preceding stage.

18. Apparatus according to Claim 11 programmed to receive a set of n input signals where n is an integer greater than 2, characterised in that the apparatus is also programmed to:
   a) produce $n(n-1)/2$ replicas of the set of input signals,
   b) in each replica select a respective signal pair differing to that selected in other replicas, and
   c) implement processing of the input signals to determine delay and rotation parameters for each replica as input signals and determine:
      i) delay and rotation parameters which implement at least one elementary paraunitary matrix providing for rotation of the respective selected signal pair only, and
      ii) which replica when transformed by the associated at least one elementary paraunitary matrix gives rise to transformed signals corresponding to improvement in a measure of strong decorrelation by at least a major part of a maximum extent obtainable over the replicas and designate these transformed signals as output signals.

19. Apparatus according to Claim 11 characterised in that the at least one elementary

paraunitary matrix implements at least one leading delay, rotation and terminal delay.

20. A computer programme for implementing strong decorrelation of signals input to computer apparatus, characterised in that it has instructions for controlling computer apparatus:-

a) to process the input signals to determine delay and rotation parameters which implement at least one elementary paraunitary matrix and transform the input signals into output signals to obtain improvement in a measure of strong decorrelation;

b) to assess the improvement in the measure of strong decorrelation, and if it is significant to designate the output signals as input signals and iterate a) and b);

c) if the improvement is not significant to designate the output signals as signals decorrelated in a wide sense.

21. A computer programme according to Claim 20 characterised in that the delay and rotation parameters which transform the input signals characterise a single elementary paraunitary matrix.

22. A computer programme according to Claim 21 characterised in that that it is arranged to control computer equipment to implement the step of producing a paraunitary matrix by cumulatively multiplying successive elementary paraunitary matrices produced by iterating processing of the input signals to determine delay and rotation parameters.

23. A computer programme according to Claim 21 characterised in that the range of signal delay parameters is a set of discrete delay vectors, and the computer programme is arranged to provide for the delay and rotation parameters to be determined by generating a respective version of the input signals delayed by each delay vector in the set, and for each version finding rotation parameters which at least approach producing maximisation of output signals' strong decorrelation.

24. A computer programme according to Claim 23 characterised in that it is arranged

to provide for the rotation parameters which at least approach producing maximisation of output signals' strong decorrelation to be determined using a pointwise decorrelation algorithm.

25. A computer programme according to Claim 20 arranged to control computer equipment to receive n input signals where n is an integer greater than 2, characterised in that it is arranged to provide for processing the input signals to determine delay and rotation parameters to comprise determining such parameters which implement at least one elementary paraunitary matrix providing for rotation of a pair of input signals and relative delay of the or as the case may be each other input signal.

26. A computer programme according to Claim 25 arranged to control computer equipment to define respective channels for the n input signals characterised in that it is arranged to provide for processing of the input signals to determine delay and rotation parameters to have n(n – 1)/2 successive stages each associated with at least one respective elementary paraunitary matrix and each providing for rotation of signals associated with a respective pair of channels and provision of relative delay associated with the or as the case may be each other channel, the first stage being arranged to process the input signals and the or as the case may be each subsequent stage being arranged to receive signals processed in the respective preceding stage.

27. A computer programme according to Claim 22 arranged to control computer equipment to receive a set of n input signals where n is an integer greater than 2, characterised in that it also provides for such equipment to:

a) produce n(n – 1)/2 replicas of the set of input signals,

b) in each replica select a respective signal pair differing to that selected in other replicas, and

c) carry out processing of determine delay and rotation parameters for each replica as input signals by:

    i) determining delay and rotation parameters which implement at least one elementary paraunitary matrix providing for rotation of the respective selected signal pair only, and

    ii) determining which replica when transformed by the associated at least one elementary paraunitary matrix gives rise to transformed

signals corresponding to improvement in a measure of strong decorrelation by at least a major part of a maximum extent obtainable over the replicas and designating these transformed signals as output signals.

28. A computer programme according to Claim 22 characterised in that the at least one elementary paraunitary matrix implements at least one leading delay, rotation and terminal delay.